

**SPECIFICATION
FOR
UPRIGHT CLEANER, VACUUM, ELECTRIC
(COMMERCIAL/INDUSTRIAL)**

(This specification is released for procurement purposes until revised or rescinded.)

Scope

The cleaners covered in this specification are upright models for commercial duty use. These cleaners are designed to operate on 120 VAC, 60 hertz, single-phase power source and are intended for general housekeeping and carpet maintenance to be used for dry pickup only.

I. CLASSIFICATION

A. TYPES, CLASSES, AND SIZES

The cleaners to be furnished in accordance with this specification shall be of the following types, classes, and sizes (as applicable):

TYPE 1:

**CLASS A - ONE MOTOR
CLASS B - TWO MOTORS**

SIZE	NOZZLE WIDTH		CURRENT DRAW	
			CLASS A	CLASS B
	MINIMUM	MAXIMUM	AMPS MINIMUM	AMPS MINIMUM
1	12"	13"	5.0	6.0
2	14"	15"	5.0	6.0
3	16"	17"	7.0	8.0
4	18"	20"	7.0	8.0

TYPE 2:

SIZE	NOZZLE WIDTH	CURRENT DRAW	
		AMPS MIN.	AMPS MAX.
1	22" - 24"	8.0	18.0
2	26" - 28"	8.0	18.0

Note: - Agitator Brush Width - refer to Para III.D.5
- The current draw is defined as the amount of current measured in amperes when the vacuum cleaner is "parked" on a tiled floor and is equipped with a clean and dry disposable filter.
(Refer to Para. IV.C.2.F)

II. APPLICABLE STANDARDS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues used shall be those in effect on the date of the solicitation or request for bids.

In the event of conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification shall supersede applicable laws and regulations unless a specific exemption has been obtained.

UNDERWRITERS' LABORATORIES (UL), INC., STANDARDS:

UL STANDARD 1017 - VACUUM CLEANING MACHINES AND BLOWER CLEANERS.

UL STANDARD 20 – ELECTRICAL SNAP SWITCHES

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS:

ASTM STANDARD F 558 - METHOD FOR MEASURING AIR PERFORMANCE CHARACTERISTICS FOR VACUUM CLEANERS.

ASTM STANDARD F 888 - METHOD FOR MEASURING MAXIMUM FUNCTIONAL VOLUME OF THE PRIMARY DUST RECEPTACLE IN A VACUUM CLEANER.

ASTM STANDARD F 420 - TEST METHODS FOR ACCESS DEPTH UNDER FURNITURE OF VACUUM CLEANER.

ASTM STANDARD F 450 - METHOD OF TESTING VACUUM CLEANER HOSE FOR DURABILITY AND RELIABILITY (PLASTIC WIRE REINFORCED).

ASTM STANDARD F 494 - METHOD FOR EVALUATING PRIMARY FILTER INTEGRITY FOR VACUUM CLEANERS.

ASTM STANDARD F 555 - TEST METHOD FOR MOTOR LIFE EVALUATION OF AN UPRIGHT VACUUM CLEANER.

ASTM STANDARD F 595 - METHOD OF TESTING VACUUM CLEANER HOSE FOR DURABILITY AND RELIABILITY (ALL-PLASTIC CLEANER).

ASTM STANDARD F 922 - TEST METHOD FOR MOTOR LIFE EVALUATION OF A HOUSEHOLD ELECTRIC MOTORIZED NOZZLE.

ASTM STANDARD F 1038 - TEST METHOD FOR MOTOR LIFE EVALUATION OF A HOUSEHOLD CANISTER VACUUM CLEANER.

III. REQUIREMENTS

A. MATERIAL

The vacuum cleaners shall be composed of materials normally used in commercial/industrial (as applicable to cleaners classification) products and shall be free from defects affecting the appearance, serviceability, or durability.

B. UL OR EQUIVALENT CONFORMANCE

The vacuum cleaner shall conform to UL Standard 1017 or equivalent tests by other agencies and laboratories approved by the North Carolina Department of Insurance to safety test and label electrical and mechanical equipment.

C. GENERAL

Each cleaner shall be complete, fully lubricated, and ready to operate. The design shall permit easy accessibility to component parts for inspection, adjustment, cleaning, or replacement, and shall provide reliable operation.

1. Each Type 1 and Type 2 cleaner shall consist of a housing, handle assembly, vacuum producer assembly, nozzle and agitator assembly, filter assembly, switch, cord assembly, tools and attachments as specified in the request for bid document. Where Type 2 units are used in tandem, all requirements apply to both units.
2. Finish - All exterior surfaces, all interior surfaces impinged upon by the airflow, and all surfaces subject to contact by the operator, shall be smooth and free from surface defects or obstructions, which may contribute to dirt adherence or operator injury. Exterior metallic surfaces shall be smooth, of uniform appearance, and suitably plated or finished if necessary to resist abrasion and corrosion. Plating and other finishes shall be in accordance with the best commercial practice.
3. Portability - Handles or grips capable of supporting the weight of the machine shall be furnished.
4. Stability - The cleaners shall conform to the stability requirements of UL 1017 or equivalent tests by other agencies and laboratories approved by the North Carolina Department of Insurance to safety test and label electrical and mechanical equipment.
5. Housings - The housings on all cleaners shall be strong, lightweight, and of good appearance. The housing shall provide a resilient non-marking bumper (or equal) on the front and sides to protect walls, doors, and furniture.
6. Vacuum producer - The motor and blower assembly shall be of rugged construction and balanced so there is minimum vibration when in operation. If the airflow generated by the blower is used to cool the motor, the air shall be adequately filtered before entering the motor.
7. Filter assembly - The filter assembly of each cleaner shall be of adequate capacity to allow passage of air through the filter at full flow of the vacuum producer and shall employ disposable or easily cleaned dirt receptacles. All joints in the collection/filtration system shall be dust tight. All filters and dust receptacles, including motor intake filters, shall be adequately fitted and secured to prevent loosening during use, and shall be easily accessible for cleaning or replacement.
8. Switch(s) - The switch(s) shall be in accordance with UL Standard 1017/UL Standard 20. The switch may be listed separately as a component but must be compatible with the cleaner electrical system.
9. Power cord assembly - Type 1 cleaners shall have power cords of 30foot minimum and Type 2 cleaners shall have power cords of 50 foot minimum. All Type 1 cleaners, except for double insulated cleaners, shall be provided with a 3 conductor power cord assembly conforming to the applicable requirements of UL Standard 1017. All power cords shall be provided with reinforcement or strain relief at its point of entry into the housing or handle. The cord shall be capable of withstanding a flexing test of 50,000 cycles for uprights and 10,000 cycles for canisters. The cord shall be measured from the point of entry into the housing or handle to the flat of the connector plug.
 - Type 2 Cleaners same as Type 1 except power cord to be 50' minimum.
10. Cord Storage - Each cleaner shall provide some means for coiling, wrapping, or otherwise storing the power cord when not in use.
11. Lubrication - The motor bearings employed in the cleaner shall be sealed or shielded and shall not require periodic lubrication. All lubricated parts shall be adequately shielded to prevent dirt entry and shall not permit excessive leakage of lubricants. Any routine lubrication (for maintenance) shall be clearly defined in the owner's manual.
12. Noise - The maximum noise generated by these cleaners while in operation shall be 90 dba. Measurements shall be taken in accordance with Para. IV.C.2.c.

13. Tools and Attachments - All tools and attachments provided with the cleaners shall be of non-ferrous alloy, suitably anodized or otherwise finished, or impact resistant non-metallic material. All corners shall be rounded and finished to protect furniture, fabrics, and operator.
14. Identification marking: Each cleaner shall be legibly marked with the manufacturers model number or part number and his name or trademark of such known character that the manufacturer shall be easily determined. The UL label, or label of other agencies and laboratories approved by the North Carolina Department of Insurance to safety test and label electrical and mechanical equipment, shall be clearly displayed either on the manufacturers nameplate or as a separate label. It shall be located where it can be easily seen and read. Each machine shall be permanently identified with a serial number unique to the machine, which can be used for tracking purposes.
15. Data requirements - Refer to Appendix 1 of this specification and the invitation for bids for data submittal requirements. When performance data is requested it shall be based upon the methods or definitions detailed in Appendix 1 of this document.
16. Base Housing Assembly - The base housing assembly shall be designed to support the entire unit with handle stored in the vertical position. The base structure shall be strong, durable, and rigid enough to support the wheel assemblies, the vacuum producer assembly(s) (where applicable), the agitator brush motor drive assembly (where applicable), during operation and shall be enclosed in a shroud of metal or impact resistant synthetic plastic. The design of the wheel assemblies and their location shall provide the necessary mobility for the intended use of the product.
- A. Wheels - Wheels shall be either bearing supported and permanently lubricated or self-lubricating polymeric wheels. All wheels shall be non-marking.
- B. Handle - The handle assembly of the upright cleaners shall be metal tubing, fiberglass, or high impact synthetic plastic. If the handle is manufactured from steel it shall have a synthetic grip. The handles of all Type 1 cleaners shall be of adequate strength and rigidity to permit elevating and rotating the agitator assembly about the rear wheels without detectable flexure. The handle shall pivot smoothly from the vertical to a near-horizontal position. Hinges, shackle joints, flexible connections shall be designed to withstand the rigorous operation of a continuous duty commercial/industrial application (constant operation for an 8 hour day). A detent or "park" position shall be provided to hold the handle in the vertical position for storage. Other detent or "work" positions are permitted. The power switch may be located on the handle.
17. Performance - The cleaners shall be subjected to the tests of Para. IV.C.2. In these performance tests, Type 1 cleaners shall develop a minimum of 90 CFM open-air flow with the dust bag removed. Type 2 cleaners shall develop a minimum of 160 CFM open-air flow with the dust bag removed.
- A. Cleaning Effectiveness - The cleaning effectiveness (pick-up) of the machine shall be a minimum of 90% when tested as defined in paragraph III.C.19.
- B. Motor(s) - The Type 1 and Type 2 cleaner motors shall be rated for continuous duty. Continuous duty is defined as constant operation for an 8-hour workday. The nameplate shall be in accordance with UL standard 1017. The agitators (see III.C.19) may be run by a separate motor or may be driven by the vacuum producer. On type 2 cleaners, tandem cleaner motor systems may be employed to achieve required performance at the larger nozzle widths.
18. Filter Assembly - The minimum capacity for cleaner dust bags are:

TYPE 1 - CLASS A	8.5 (DRY) QUARTS
TYPE 1 - CLASS B	6.0 (DRY) QUARTS
TYPE 2	34.0 (DRY) QUARTS

(NOTE - To be measured in accordance with ASTM F-888)

Upright cleaners may utilize disposable dust bags or a readily removable dust cup used in conjunction with the exterior filter bag. All connections between the nozzle and the bag shall be dust tight. The bag may be enclosed in a shroud of plastic or suitable synthetic material. Cleaners using disposable dust bags shall be

furnished with a minimum of two (2) disposable bags. All cleaners should discharge the dirt through a suitably designed tube such that the dirt enters the top portion of the dust bags. (commonly known as "top fill").

19. Nozzle and Agitator Assembly - The nozzle shall be of rugged metal or polymeric construction and shall effectively funnel dirt/litter from the surface being cleaned to the suction channel. The nozzle shall automatically adjust or shall be adjustable in height to compensate for varying pile depths. The agitator shall be belt driven from the vacuum motor output shaft or independently driven by a separate motor (commonly referred to as single and two motor models). The model desired shall be defined in the ordering data (Paragraph VI.) The agitator shall be provided with high quality bristles and may employ beaters (it is not mandatory to provide an agitator with beater bars). The agitator brush width should not be less than 85% of the nozzle width. The bristles or the entire agitator shall be easily replaceable. When tools and attachments are employed, a means shall be provided to attach these accessories without disassembly of the unit. On Type 2 cleaners, tandem systems may be employed to achieve total nozzle cleaning width. e.g.; two side agitators.

20. Tools and Attachments - When specified (in bid request), the Type 1 cleaners shall be furnished with a hose, a wand assembly, bare floor tool, upholstery nozzle, brush, and crevice tool. (See III.C.14)

D. MANUALS

Each cleaner shall be furnished with a manual of operating instructions and an illustrated parts breakdown (IPB). The IPB shall identify all components by part number to the lowest repair level.

E. WORKMANSHIP

The cleaners and all tools and attachments shall be constructed, assembled, and finished to assure good quality equipment of neat general appearance and free from imperfections and damage that may affect appearance, serviceability or durability.

IV. QUALITY ASSURANCE PROVISIONS

A. Responsibility For Inspection

Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements detailed in the specification. Except as otherwise specified, the contractor may utilize his own facilities or any commercial laboratory acceptable to the state of North Carolina. The State of North Carolina reserves the right to perform any of the inspections or tests set forth in the specifications where such action is deemed necessary to assure that supplies and services conform to prescribed requirements. The contractor is responsible for insuring that components and materials used were manufactured, examined, and tested in accordance with referenced specifications and standards.

Responsibility for Compliance - All items must meet all requirements of section III and section V of this specification. The inspections set forth in this document shall become a part of the contractor's overall inspection system or quality control program. The absence of any inspection requirements in this or any referenced document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the State of North Carolina for acceptance comply with all the requirements of the contract. Sampling in quality assurance does not authorize submission of known defective material, either indicated or actual, nor does it commit the State of North Carolina to acceptance of defective material.

B. TESTING

In lieu of using his own facilities, the contractor may submit a report of analysis and performance of cleaner from a laboratory acceptable to the State of North Carolina, whether an independent testing facility or the laboratory of the component material supplier, as evidence of compliance with the specification requirements. The report shall include, in addition to the actual data, the manufacturer's name, the name and address of the testing laboratory, and the date of test.

C. EXAMINATION AND TESTS

Prior to the contract award the State of North Carolina, at its discretion, reserves the right to examine and perform acceptance tests for any one or all the requirements listed in this section.

1. End Item Inspection - The sample cleaners shall be visually examined for the following specific defects. The cleaners and tools shall also be examined for quality of workmanship (See III.F)
 - A. No UL listing or other evidence of conformance to UL Standard 1017 or equivalent listings by other agencies and laboratories approved by the North Carolina Department of Insurance to safety test and label electrical and mechanical equipment (See III.C.15)
 - B. Not finished as specified (See III.C.3)
 - C. Handles and grips not as specified (See III.C.4)
 - D. Cleaner not stable (See III.C.5)
 - E. Power cord not as specified (See III.C.10)
 - F. Tools and attachments not as specified (See III.C.14 and applicable requirements).
 - G. Manual is inadequate (See III.E).
 - H. Dimensions not as specified.
 - I. No permanent serial number on the machine (III.C.15)
2. Acceptance Tests - Unless otherwise specified a certificate of conformance to these test requirements is acceptable in lieu of testing each lot. The contractor shall have available for review evidence that those tests specified by this document (Para.IV.C.2.) and by the industry standards referenced herein have been performed, that the product being offered has been manufactured using the same materials, processes, and techniques, and is otherwise identical to the product tested. The State of North Carolina reserves the right to perform all or any single test to ensure compliance with this specification.
 - A. UL or Equivalent Tests - The cleaners shall be tested as specified by UL Standard 1017 or equivalent tests by other agencies and laboratories approved by the North Carolina Department of Insurance to safety test and label electrical and mechanical equipment.
 - B. General Operations - This operational test shall be performed with the cleaner connected to a power source conforming to the motor nameplate data. Each cleaner shall be operated in the condition received for 1 hour with the orifice wide open. After this run all accessible lubrication points shall be visually checked. Any evidence of excessive leaking, galling or lack of lubrication shall be cause for rejection.
 - C. Noise Tests - The cleaner shall be set up in operational configuration with the agitator operating on Type 1 and 2 cleaners. The tests shall be taken with the cleaner cleaning carpet placed upon a test pad. With the cleaner in operation, two (2) readings shall be taken using the A weighted, damped, or slow response scale. A third reading shall measure the background noise after shutdown. The readings shall be taken 4 feet behind the cleaner, 6 feet above the floor with the handle in a position approximately where an operator would be holding it. If the difference between the average of the first two readings and the background reading is greater than 14 db, disregard the background reading. If less than a 14 db difference, combine the readings logarithmically. The average or log sum (as applicable) shall not be greater than 90 DBA.
 - D. Performance Tests - Each vacuum cleaner shall be tested in accordance with ASTM F557 with the exception of the following modifier. The test sample shall be fitted with an interface plate that seals around the perimeter of the nozzle intake, does not interfere with the rotation of the agitator, and is capable of being mounted directly to the plenum chamber. The airflow and water lift data will be taken with and without the filter bag attached. Airflow will be measured in a 4" diameter duct attached to the vacuum motor outlet. The cleaners shall demonstrate the capability to develop the minimum CFM airflow as specified in III.D.3 as applicable.

- E. Cleaning Effectiveness Test - The purpose of this test is to establish the "pick-up" effectiveness of the cleaner. A predetermined amount, by weight, of sand is placed on a carpet and the machine operated manually for a total of 14 cycles. The collector bag is emptied and the amount of pick-up is weighed. The cleaner shall "pick-up" a minimum of 90% of the sand distributed on the carpet to successfully complete this test.

The nylon carpet, a tufted cut pile, having a density of 79.2 tufts/sq. Inch and a pile of height of 0.375 inches, is glued to a 1/2" plywood panel base measuring 4 ft. X 4 ft.

A predetermined amount of sand is distributed over an area determined by the machine cleaning width and the length of the test carpet. The machine is equipped with a disposable paper collector bag then operated back and forth over the area for a total of 14 cycles. The cleaning swath width is recorded and the collector bag contents weighed. The cleaning swath width shall meet the specification requirements (agitator brush width) and the pick-up effectiveness shall be a minimum of 90%

- F. Power Tests - The cleaner shall be switched on and allowed to run for ten minutes. The current draw (amps), the power consumed (watts) and the input line voltage shall be recorded. The measurements shall be taken with the disposable bag (eg; paper) attached.

V. PREPARATION FOR DELIVERY

The vacuum cleaners shall be packaged and packed in accordance with industry standards and shall be in accordance with the contract or purchase order. Marking shall be in accordance with the contract or purchase order.

VI. ORDERING DATA

The purchasers should select the preferred options permitted herein and include the following in procurement documents.

1. Title, number, and date of this specification.
2. Type, class, and size desired (if applicable) (see Para. I.)
3. Single or two motor models required. (Paragraph III.C.17.b)
4. Tools required for Type 1 (see Para. III.C.20)
5. Voltage required (see Para scope)
6. Packaging, packing, and marking required (see Para. V.)

VII. WARRANTY

The manufacturer's standard warranty shall warrant the owner that all vacuum cleaners furnished under this contract will be new, of good material and workmanship, and agrees to replace promptly any part or parts which by reason of defective material or workmanship shall fail under the intended normal use as shown in this specification, free of negligence or accident, for a minimum of 12 months from date put in operation. Any provisions in manufacturer's standard warranty, which exceed the warranty requirements herein, shall become a part of the contract. The warranty exempts normal expendable parts; drive belts, agitator brushes. Such replacement shall include all parts, labor, and transportation/ shipping costs incurred, free of charge to the state. The bidder shall include as part of the submittal, a list of "expendable" parts that need to be replaced during the first year of service and the frequency of recommended preventive maintenance operations during this period.

APPENDIX

This appendix defines the data and the procedures for obtaining data to be used in evaluating the invitation for bid. The information will be requested in the invitation for bid and must be completed for each line item bid.

1. Performance Data (airflow) - Is the data resulting from the tests performed in accordance with the specification paragraphs IV.C.2.D and III.C.17.
2. Power Consumption - Is the wattage draw from the machine when it's operating at maximum air flow (open). Cleaners are to be measured without the agitator being in contact with the carpet, and without restricting the

airflow through the nozzle intake. (raise agitator bar and stand unit on a tiled floor). The measurements shall be taken with the disposable bag (eg; paper) attached.

If the agitator is driven separately by an independent electric motor the wattage draw of that motor must be added and the sum so stated. If multiple cleaner motors are employed on Type 2 cleaners, the sum of their wattage draw must be stated. These wattage values shall be applied to the energy efficiency formula as outlined in the invitation for bid.

3. Current Draw - Is the amperage of the machine when its operating at maximum air flow (open). Cleaners are to be measured without the agitator being in contact with the carpet, and without restricting the airflow through the nozzle intake. (raise agitator bar and stand unit on a tiled floor) the measurements shall be taken with the disposable bag (eg; paper) attached.

If the agitator is driven separately by an independent electric motor the amperage of that motor must be added and the sum so stated. If multiple cleaner motors are employed on Type 2 cleaners, the sum of their amperes must be stated. These values shall be applied to the energy efficiency formula as outlined in the invitation for bid.

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